

Camera modules industry: after proliferation, Yole announces a diversification¹

OUTLINES:

- The overall revenue of the global camera module market is growing from US\$31.3 billion in 2019 to US\$57 billion in 2025, at 10.5% CAGR during this period².
- This industry is growing at a pace of 8.2% in volume and 10.5% in revenue.
- The automotive market segment reached about US\$4 billion in 2019 against US\$25,6 billion for consumer & mobile applications.
- Competitive landscape:
Diverse approaches are not only driving the growth of the leaders, but also offering opportunities to second tier players.
The ecosystem is dominated by the strong development of Chinese and Korean players. The industry leader LG Innotek continues to maintain its position.
- In the years to come the US-China trade war could play a big role in reorganizing the ranking of CCM³ players.

*“At Yole Développement (Yole), we expect the volume of global camera module shipments to expand from 5.5 billion units in 2019 to 8.9 billion in 2025, at 8.2% CAGR”, asserts **Richard Liu, Technology and Market Analyst, Photonics and Sensing at Yole.** “Mobile multi-cameras started in early stage 2015-2016, moving from single to dual cameras, then maturing to triple in 2018 and 2019. Now they have moved toward quad in 2020. Diverse modules implement diverse levels of zoom or wide-angle capability. This diversity is enriched by sensing camera modules. This is the case for front structured light for 3D facial recognition, the rear ToF⁴ for AR⁵ applications, and the optical fingerprint module placed under the screen”.*

In this dynamic context, Yole and its partner System Plus Consulting investigate disruptive imaging technologies and related markets in depth.

“Our aim is to point out the latest innovations and to underline the overall business opportunities”, comments **Richard Liu from Yole.**

¹ Extracted from:

CMOS Camera Module Industry for Consumer & Automotive Yole Développement, 2020

Smartphone Camera Module Comparison 2020 Vol 2: Focus on Samsung, System Plus Consulting, 2020

² CAGR: Compound Annual Growth Rate

³ CCM: Compact Camera Module

⁴ ToF: Time of Flight

⁵ AR: Augmented Reality

In this regard Yole’s imaging team releases today CMOS Camera Module Industry for Consumer & Automotive 2020 report.

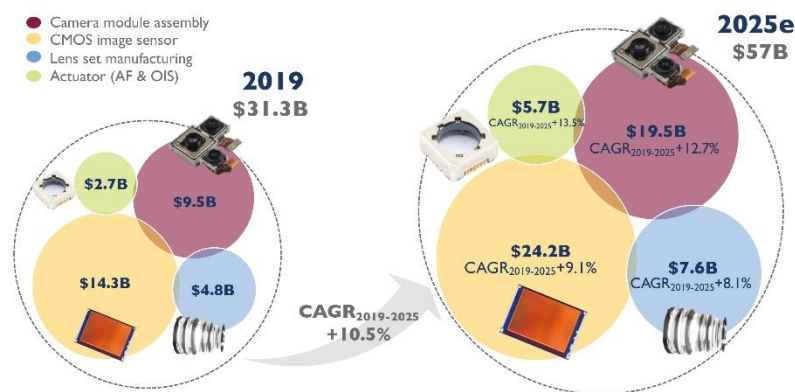
This study provides the latest major information and key facts of the camera module industry. Including technical market segmentation, trends and forecasts, key players, key applications, this new report identifies and deeply analyses the ecosystem. It gives a detailed description of the market and technologies involved. In this latest edition, the market research and strategy consulting company is offering key insights for navigating the camera module market.

In parallel, System Plus Consulting’s analysts release a report entirely dedicated to Samsung’s technical choices for its wild collection of smartphones: Smartphone Camera Module Comparison 2020 Vol 2: Focus on Samsung. Indeed, this report includes a complete technology and cost analysis of the Galaxy S7, Galaxy S8, Galaxy S9+, Galaxy S10+ and Galaxy S20 Ultra, and gives detailed technical information about the cameras, such as module surface, camera volume, number and type of lenses, resolution, pixel size and CIS technology node. Moreover, this study delivers a summary of the other Samsung smartphone series, including the Galaxy Notes, Galaxy A series, Samsung Fold and Galaxy J.

What are the economic and technological challenges related to the camera module industry? What are the key drivers? Who are the suppliers to watch, and what innovative technologies are they working on? Both companies present today their vision of the camera module industry and disruptive technologies.

2019-2025 CMOS camera module market forecast by component (in \$B)

(Source: CMOS Camera Module Industry for Consumer & Automotive 2020 report, Yole Développement, 2020)



According to the new CMOS Camera Module Industry for Consumer & Automotive 2020 report, the desire to capture the perfect picture used to be accomplished through complex and expensive DSLR⁶ cameras and the use of interchangeable lens systems. The multiple lens possibility has therefore been the cornerstone in the pursuit of extreme imaging performance. Today's mobile cameras follow a similar mindset but using multiple fixed lenses

⁶ DSLR: Digital Single-Lens Reflex

to improve photography performance. Quickly adopted by large manufacturers, this trend led to 17.3% year-over-year growth in 2019.

In the automotive market, the trend is to massively adopt rear cameras and ADAS⁷ forward cameras. The average number of cameras per car goes up because of the need for new applications, such as the 360-degree view, in cabins and e-mirrors. Again, in this market the diversity in camera design is very high.

In the consumer electronics field, vision is an important element of smart products, assistant personal robotics and consumer drones. These new applications will increase the demand for cameras and drive the camera module market even higher in the years to come.

According to **Pierre Cambou, Principal Analyst in the Photonic and Display Division at Yole:** *“In the mobile world, smartphone OEMs⁸ are in fierce competition to add camera functions and improve camera performance with increasing pixel resolution upgrades, combined with multiple-camera designs. The competition for the supply of high-quality CIS⁹ exceeded the worldwide capacity at the end of 2019, resulting in shortages and price hikes. While the recent pandemic tamed global economics, the camera module industry is expected to maintain double digit growth for the next five years”.*

Camera Module Supplier Comparison 2020

(Source: Smartphone Camera Module Comparison 2020 Vol 2: Focus on Samsung, System Plus Consulting, 2020)



According to **System Plus Consulting**, in the Smartphone Camera Module Comparison 2020 Vol 2: Focus on Samsung report: the present state-of-the-art of CMOS technology provides better resolution and smaller pixels, low power consumption and cost improvements. In this context, Samsung is a major player among CIS manufacturers and high-end smartphone suppliers. Moreover, in recent years, we observed that Samsung has rolled-

⁷ ADAS: Advanced Driver Assistance System
⁸ OEM: Original Equipment Manufacturers
⁹ CIS: CMOS Image Sensors

out multi-camera smartphones. Its technical choices are not always linear, showing Samsung is not afraid to innovate and test different solutions to enhance smartphone's photography.

Yole expects the revenue of the global camera module market to expand from US\$31.3 billion in 2019 to US\$57.0 billion in 2025, at 10.5% CAGR.

Beyond the sensor itself, innovations in all the different subcomponents of the camera module are in high demand. The introduction of periscope lenses was a major event that allowed 5x or even 10x optical magnification within the existing thickness of mobile phones. OIS¹⁰ is another critical technology for photography especially for telephoto, hence players are also looking for innovations in this area, using new materials, MEMS or liquid lens to replace the VCM¹¹ approach.

Thanks to the additional techniques and innovation, camera modules are increasing in value significantly over the years. Technical upgrades of camera modules include the "Active Alignment" process to align multiple cameras well. There will be several innovations in camera module integration, like pop-up cameras or side-up cameras, and under-screen cameras in future. These innovations will integrate different materials from various sources, which should provide a great deal of opportunity to the market and facilitate the application of camera modules to more new products.

All year long, Yole Développement and System Plus Consulting publish numerous reports. In addition, our experts realize various key presentations and organize key conferences.

In this regard, the 3D Sensing for Consumer Forum 2020 will study the second wave of 3D sensing technology: Could Time-of-Flight be the decisive technology for future consumer applications? On September 10th in Shenzhen, China.

Confirmed speakers:

- Richard Liu, Imaging market and technology analyst at Yole Développement*
- Taha Ayari, Technology & cost analyst, compound semiconductor, System Plus Consulting*
- Jianfeng Feng, 3D product manager at sunny optical*
- Dr. Bernd Buxbaum, CEO and founder at pmdtechnologies ag and executive board member at ifm group of companies*
- Xiaochi Chen, General manager of vertilite*

In addition, do not miss the Embedded Vision Summit 2020 (Virtual Conference) from 15 to 25 September. Register here.

Throughout the year, discover the numerous Camera Module-related reports. Make sure to be aware of the latest news coming from the industry and get an overview of our activities, including interviews with leading companies and more on i-Micronews. Stay tuned!

¹⁰ OIS: Optical image Stabilization

¹¹ VCM : Voice Coil Motor



Press Release

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About our analysts

Richard Liu is a Technology and Market Analyst in the Photonics, Sensing & Display division at Yole Développement, part of Yole Group of Companies. Based in Shenzhen (China), Richard is dedicated on imaging activity (Monitors) as well as the development of technology & market reports. Prior to Yole, Richard was engaged in camera module design on image sensor, AF/OIS at Onsemi, before this, he worked as a customer-application-technologist in Micron/Aptina Imaging. Richard has over 12 years post graduate experience in both of imaging semiconductor and camera module industry, he has the successful track record in developing projects for the tier one smart phone and module makers, which brought him wide industry connection in the CMOS image sensor supply chain and ecosystem Richard graduated from Wuhan University (China) and holds an Electronics Engineering Degree.

Pierre Cambou MSc, MBA, is a Principal analyst in the Photonic and Display Division at Yole Développement (Yole). Pierre's mission is dedicated to imaging related activities by providing market & technology analyses along with strategy consulting services to semiconductor companies. He is responsible for the CIS Quarterly Market Monitor while he has authored more than 15 Yole Market & Technology reports. He has been deeply involved in the design of early mobile camera modules and the introduction of 3D semiconductor approaches to CMOS Image Sensors (CIS). Known as an expert in the imaging industry, he is regularly interviewed and quoted by leading international media. Pierre has an Engineering degree from Université de Technologie de Compiègne (France) and a Master of Science from Virginia Tech. (VA, USA), Pierre also graduated with an MBA from Grenoble Ecole de Management (France).

Alok Bharti, Technology and Cost analyst at System Plus Consulting.

As Head of Department Devices at System Plus Consulting, **Elena Barbarini** is in charge of costing analyses for MEMS, IC and Power Semiconductors. She has a deep knowledge of Electronics R&D and Manufacturing environment. Elena holds a Master in Nanotechnologies and a PhD in PowerElectronics.

Nicolas Radufe is in charge of physical analysis at System Plus Consulting. He has a deep knowledge in chemical and physical analyses. He previously worked in microelectronics R&D for CEA/LETI in Grenoble and for STMicroelectronics in Crolles.

About the reports

CMOS Camera Module Industry for Consumer & Automotive 2020

After proliferation, diversification of camera modules comes into play and sustains the growth of the CMOS Camera Module industry. – Performed by Yole Développement

Companies cited:

AAC Technologies, Ability Opto, AGC, AMS, Alps, Apple, Asia Optical, ASM, Brigates, BYD Microelectronics, Calin Technology, Cammsys, Cha Diostech, Chicony, Continental, Cowell Optics, Cresyn, Crystal-Optech, Ddk, DJI, Foxconn, Fujifilm, Fujinon, Fujitsu, Galaxycore, Genius Optical, Google, Gopro, Haesung Optics, Himax, Hirose, Hoya, Huawei, IM, Intel, Jawah, Jabil, JSR, Kantatsu, Kinko Optical, Kolen, Kyocera, Largan, Lenovo, LG Innotek, Luxvision, Magna, Materion, Mcnex, Microsoft, Mitsumi, Mobileye, Nalux, New Shicoh, Nidec, NTK, Ofilm, OmniVision, On Semiconductor, OPPO, Optis, Panasonic, Parrot, Partron, Pixart, Pixelplus, Powerlogic, Primax, Q-Tech, Ricoh, Samsung, Schott, Semco, Sharp, Sekonix, SK Hynix, Softkinetic, Sony, STMicroelectronics, Sunny Optical, Sunex, Superpix, Suyin, TDK, Toshiba, Truly, Valeo, Viavi, Vivo, Volvo, Xiaomi, Xperi, Zeiss, Zeon, ZTE,... and many more

Smartphone Camera Module Comparison 2020 Vol 2: Focus on Samsung

Evolution of Samsung's smartphone camera since 2016 with detailed technical and cost analyses of the Galaxy S20 Ultra Galaxy S10+, Galaxy S9+, Galaxy S8 and Galaxy S7. – Performed by System Plus Consulting

Related reports:

- [CMOS Image Sensor Quarterly Market Monitor](#)

- [3D Imaging & Sensing 2020](#)
- [Status of the CMOS Image Sensor Industry 2019](#)
- [Smartphone Camera Module Comparison 2020 Volume I](#)
- [Apple iPad Pro LiDAR Module](#)
- [Mobile Camera Module Comparison 2019](#)
- [Mobile CMOS Image Sensor Comparison 2019](#)

About System Plus Consulting

System Plus Consulting specializes in the cost analysis of electronics, from semiconductor devices to electronic systems. Created more than 20 years ago, System Plus Consulting has developed a complete range of services, costing tools and reports to deliver in-depth production cost studies and estimate the objective selling price of a product... [More](#)

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Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide... [More](#)

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